

WHAT IS CLAIMED:

Sub 7
G1

5

1. A composition for coating optical fibers comprising:
an oligomeric component present in an amount of about 15 weight percent or
less and
a monomeric component present in an amount of about 75 weight percent or
more,

10

wherein the monomeric component comprises two or more monomers when the
composition is substantially devoid of the oligomeric component and the
cured product of the composition has a Young's modulus of at least
about 650 MPa.

15

2. The composition according to claim 1, wherein the cured product of the
composition has a Young's modulus of at least about 900 MPa.

3. The composition according to claim 1, wherein the cured product of the
composition has a Young's modulus of at least about 1100 MPa.

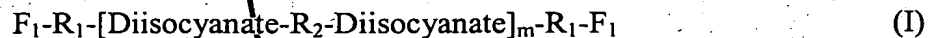
20

4. The composition according to claim 1, wherein the cured product of the
composition has a Young's modulus of at least about 1700 MPa.

5. The composition according to claim 1, wherein said oligomeric component
comprises an ethylenically unsaturated oligomer.

25

6. The composition according to claim 5, wherein said ethylenically unsaturated
oligomer is a difunctional oligomer according to formula (I)



30

wherein F_1 is independently a reactive functional group selected from the group
of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl
ether, and vinyl ester;

R_1 is independently selected from the group of $-C_{2-12}O-$, $-(C_{2-4}-O)_n-$, $-C_{2-12}O-(C_{2-4}-O)_n-$, $-C_{2-12}O-(CO-C_{2-5}O)_n-$, and $-C_{2-12}O-(CO-C_{2-5}NH)_n-$;

R_2 is selected from the group of polyether, polyester, polycarbonate, polyamide, polyurethane, polyurea, and combinations thereof;

n is a whole number from 1 to 30; and

m is a whole number from 1 to 10.

7. The composition according to claim 5, wherein said ethylenically unsaturated oligomer is a polyfunctional oligomer according to formula (II), (III) or (IV):

multiisocyanate- $(R_2-R_1-F_2)_x$ (II)

polyol- $[(diisocyanate-R_2-diisocyanate)_m-R_1-F_2]_x$ (III)

multiisocyanate- $(R_1-F_2)_x$ (IV)

wherein F_2 independently represents from 1 to 3 functional groups selected from the group of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl ether, and vinyl ester;

R_1 is independently selected from the group of $-C_{2-12}O-$, $-(C_{2-4}-O)_n-$, $-C_{2-12}O-(C_{2-4}-O)_n-$, $-C_{2-12}O-(CO-C_{2-5}O)_n-$, and $-C_{2-12}O-(CO-C_{2-5}NH)_n-$;

R_2 is selected from the group of polyether, polyester, polycarbonate, polyamide, polyurethane, polyurea and combinations thereof;

n is a whole number from 1 to 10;

x is a whole number from 1 to 10; and

m is a whole number from 1 to 10.

8. The composition according to claim 1, wherein said oligomeric component is present in an amount of less than about 13 weight percent.

9. The composition according to claim 8, wherein said oligomeric component is present in an amount of less than about 10 weight percent.

10. The composition according to claim 9, wherein said composition is substantially devoid of said oligomeric component.

11. The composition according to claim 1, wherein said monomeric component comprises an ethylenically unsaturated monomer.

12. The composition according to claim 11, wherein said ethylenically unsaturated monomer is selected from the group of a monofunctional monomer, a polyfunctional monomer, and mixtures thereof.

13. The composition according to claim 11, wherein said ethylenically unsaturated monomer comprises a monofunctional monomer having a functional group selected from the group of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl ether, vinyl ester, and acid ester.

14. The composition according to claim 13, wherein said monofunctional ethylenically unsaturated monomer is selected from the group of hydroxyalkyl acrylates, long- and short-chain alkyl acrylates, aminoalkyl acrylates, alkoxyalkyl acrylates, single and multi-ring cyclic aromatic or non-aromatic acrylates, alcohol-based acrylates, acrylamides, vinylic compounds, acid esters, and combinations thereof.

15. The composition according to claim 11, wherein said ethylenically unsaturated monomer comprises a polyfunctional monomer having more than one functional group independently selected from the group of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl ether, vinyl ester, acid ester, and combinations thereof.

16. The composition according to claim 15, wherein said polyfunctional ethylenically unsaturated monomer is selected from the group of alkoxyated bisphenol A diacrylates, methylolpropane polyacrylates with and without alkoxylation, alkoxyated glyceryl triacrylates, erythritol polyacrylates with and without alkoxylation, isocyanurate polyacrylates, alcohol polyacrylates with and without alkoxylation, epoxy acrylates, single and multi-ring cyclic aromatic or non-aromatic polyacrylates, and combinations thereof.

17. The composition according to claim 1, wherein said monomeric component is present in an amount of about 80 to about 99 weight percent.

18. The composition according to claim 17, wherein said monomeric component is present in an amount of about 85 to about 98 weight percent.

19. The composition according to claim 1 further comprising:
a polymerization initiator

20. The composition according to claim 1, wherein
said oligomeric component comprises a polyether urethane acrylate oligomer
present in an amount of about 10 weight percent,
said monomeric component comprises a ethoxylated(8) bisphenol-A diacrylate
monomer present in an amount of about 22 weight percent and a
ethoxylated(4) bisphenol-A diacrylate monomer present in an amount of
about 65 weight percent, and
said composition further comprises a photoinitiator present in an amount of
about 3 weight percent.

21. An optical fiber comprising:
a glass fiber;
a primary coating encapsulating said glass fiber; and
a secondary coating encapsulating said primary coating, said secondary coating
being the cured product of a composition comprising
an oligomeric component present in an amount of about 15 weight percent or
less; and
a monomeric component present in an amount of about 75 weight percent or
more;
wherein said secondary coating has a Young's modulus of at least about 650
MPa.

22. The optical fiber according to claim 21, wherein the cured product of the composition has a Young's modulus of at least about 900 MPa.

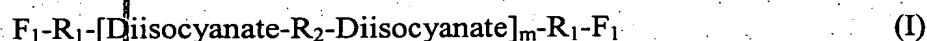
23. The optical fiber according to claim 22, wherein the cured product of the composition has a Young's modulus of at least about 1700 MPa.

24. The optical fiber according to claim 21 wherein said secondary coating has an outer surface having a coefficient of friction of less than about 0.43.

25. The optical fiber according to claim 21 wherein said coefficient of friction comprises less than about 0.38.

26. The optical fiber according to claim 21, wherein said oligomeric component comprises an ethylenically unsaturated oligomer.

27. The optical fiber according to claim 26, wherein said ethylenically unsaturated oligomer is a difunctional oligomer according to formula (I)



wherein F_1 is independently a reactive functional group selected from the group of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl ether, and vinyl ester;

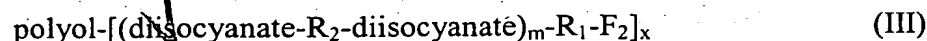
R_1 is independently selected from the group of $-C_{2-12}O-$, $-(C_{2-4}O)_n-$, $-C_{2-12}O-(C_{2-4}O)_n-$, $-C_{2-12}O-(CO-C_{2-5}O)_n-$, and $-C_{2-12}O-(CO-C_{2-5}NH)_n-$;

R_2 is selected from the group of polyether, polyester, polycarbonate, polyamide, polyurethane, polyurea, and combinations thereof;

n is a whole number from 1 to 30; and

m is a whole number from 1 to 10.

28. The optical fiber according to claim 26, wherein said ethylenically unsaturated oligomer is a polyfunctional oligomer according to formula (II) (III), or (IV):



multiisocyanate-(R-F₂)_x (IV)

wherein F₂ independently represents from 1 to 3 functional groups selected from the group of acrylate, methacrylate, acrylamide, N-vinyl amide, styrene, vinyl ether, and vinyl ester;

R₁ is independently selected from the group of -C₂₋₁₂O-, -(C₂₋₄-O)_n-, -C₂₋₁₂O-(C₂₋₄-O)_n-, -C₂₋₁₂O-(CO-C₂₋₅O)_n-, and -C₂₋₁₂O-(CO-C₂₋₅NH)_n-;

R₂ is selected from the group of polyether, polyester, polycarbonate, polyamide, polyurethane, polyurea, and combinations thereof;

n is a whole number from 1 to 10;

x is a whole number from 1 to 10; and

m is a whole number from 1 to 10.

29. The optical fiber according to claim 21, wherein said oligomeric component is present in an amount of less than about 10 weight percent.

30. The optical fiber according to claim 29, wherein said composition is substantially devoid of said oligomeric component.

31. The optical fiber according to claim 30, wherein said monomeric component comprises two or more monomers.

32. The optical fiber according to claim 21, wherein said monomeric component comprises an ethylenically unsaturated monomer.

33. The optical fiber according to claim 32, wherein said ethylenically unsaturated monomer is selected from the group of a monofunctional monomer, a polyfunctional monomer, and mixtures thereof.

34. The optical fiber according to claim 21, wherein said monomeric component is present in an amount of about 80 to about 99 weight percent.

35. The optical fiber according to claim 34, wherein said monomeric component is present in an amount of about 85 to about 98 weight percent.

5 36. The optical fiber according to claim 21, wherein said composition further comprises:
a polymerization initiator.

10 37. The optical fiber according to claim 21, wherein
said oligomeric component comprises a polyether urethane acrylate oligomer
present in an amount of about 10 weight percent;
said monomeric component comprises a ethoxylated(8) bisphenol-A diacrylate
monomer present in an amount of about 22 weight percent and a
ethoxylated(4) bisphenol-A diacrylate monomer present in an amount of
about 65 weight percent; and
15 said composition further comprises a photoinitiator present in an amount of
about 3 weight percent.

20 38. The optical fiber according to claim 21 wherein said Young's modulus
comprises more than about 1300 MPa, and a Young's modulus of said primary
coating comprises about 3.0 MPa or less.

39. The optical fiber according to claim 38 wherein said Young's modulus of said
primary coating comprises about 1.5 MPa or less.

25 40. The optical fiber according to claim 22 having a microbend attenuation of less
than 2.25 dB/m at a wavelength of 1550 nm.

30 41. The optical fiber according to claim 22 having a microbend attenuation of less
than 0.53 dB/m at a wavelength of 1550 nm.

42. The optical fiber according to claim 22 having a microbend attenuation of less
than 3.00 dB/m at a wavelength of 1625 nm.

43. The optical fiber according to claim 42 having a microbend attenuation of less than 0.75 dB/m at a wavelength of 1625 nm.

5 44. A composition for coating optical fibers comprising:
an oligomeric component present in an amount of more than about 15 weight percent; and
a monomeric component present in an amount of less than about 82 weight percent,
10 wherein the cured product of the composition has a Young's modulus of at least about 900 MPa.

15 45. The composition according to claim 44, wherein the cured product of the composition has a Young's modulus of at least about 1700 MPa.

20 46. An optical fiber comprising:
a glass fiber;
a primary coating encapsulating said glass fiber; and
a secondary coating encapsulating said primary coating, said secondary coating being the cured product of a composition comprising:
an oligomeric component present in an amount more than about 15 weight percent; and
a monomeric component present in an amount less than about 82 weight percent;
25 wherein said secondary coating has a Young's modulus of at least about 900 MPa and a microbend attenuation of less than 2.25 dB/m at a wavelength of 1550 nm or a microbend attenuation of less than 3.00 dB/m at a wavelength of 1625 nm.

30 47. The optical fiber according to claim 46, wherein the cured product of the composition has a Young's modulus of at least about 1700 MPa.

48. The optical fiber according to claim 46, wherein said secondary coating has an outer surface having a coefficient of friction of less than about 0.43.

49. The optical fiber according to claim 48, wherein said coefficient of friction comprises less than about 0.38.

50. The optical fiber according to claim 46, wherein said Young's modulus comprises more than about 1300 MPa, and a Young's modulus of said primary coating comprises about 3.0 MPa or less

51. The optical fiber according to claim 50, wherein said primary coating has a Young's modulus of about 1.5 MPa or less.

52. The optical fiber according to claim 46 having a microbend attenuation of less than 1.50 dB/m at a wavelength of 1550 nm.

53. The optical fiber according to claim 46 having a microbend attenuation of less than 0.53 dB/m at a wavelength of 1550 nm.

54. The optical fiber according to claim 46 having a microbend attenuation of less than 0.75 dB/m at a wavelength of 1625 nm.

55. The optical fiber according to claim 46 having a microbend attenuation of less than 0.20 dB/m at a wavelength of 1625 nm.

56. The optical fiber according to claim 22 wherein the fiber comprises a single mode fiber.

57. The optical fiber according to claim 56 further comprising an effective area of at least $60 \mu\text{m}^2$.

58. The optical fiber according to claim 57 wherein said effective area comprises at least $70 \mu\text{m}^2$.

5 59. The optical fiber according to claim 46 wherein the fiber comprises a single mode fiber.

60. The optical fiber according to claim 59 further comprising an effective area of at least $60 \mu\text{m}^2$.

10 61. The optical fiber according to claim 60 wherein said effective area comprises at least $70 \mu\text{m}^2$.

62. The optical fiber according to claim 46 wherein an attenuation of the fiber comprises of less than about 0.25 dB/km at a wavelength of 1550 nm.

15 63. The optical fiber according to claim 62 wherein said attenuation comprises less than 0.22 dB/km.

20 64. The optical fiber according to claim 21 wherein an attenuation of the fiber comprises of less than about 0.25 dB/km at a wavelength of 1550 nm.

65. The optical fiber according to claim 64 wherein said attenuation comprises less than 0.22 dB/km.

25 66. A composition for coating an optical fiber comprising:
an oligomeric component comprising a polyether urethane diacrylate oligomer
present in an amount of about 10 weight percent,
a monomeric component comprising an epoxy acrylate monomer present in an
amount of about 5 weight percent,
30 a second monomeric component comprising an ethoxylated(4) bisphenol A
diacrylate monomer present in an amount of about 82 weight percent,

21
comp.
a photoinitiator comprising a bis(2,4,6-trimethylbenzoyl) phenyl phosphine
oxide present in an amount of about 1.5 weight percent ,
a second photoinitiator comprising a 1-hydroxycyclohexyl phenyl ketone,
present in an amount of about 1.5 weight percent, and
5 an additive comprising a thiodiethylene bis(3,5-di-*tert*-butyl)-4-
hydroxyhydrocinnamate present in an amount of about 0.5 pph.

10

add
a27